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Report

on

The Impact of Obesity on Health

in

South Carolina

Douglas E. Bryant
Commissioner

December 1999

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FOREWARD

South Carolina's high rates of obesity and the resulting obesity-related health conditions exact a high toll on the health of our citizens and the financial resources of our State. The South Carolina Advisory Committee on Obesity was established by the South Carolina Department of Health and Environmental Control as a result of Concurrent Resolution S.252, sponsored by Senator Warren Giese. The Advisory Committee was created to prepare a report on obesity for the South Carolina State Legislature. The report contains a description of the problem, examples of approaches to prevention and management in children and adults, and research currently being conducted in the State.

The Committee Report can serve as a foundation for the development of a coordinated and comprehensive statewide initiative to impact the high rates of childhood and adult obesity and to reduce obesity-related costs in South Carolina. Members of the Advisory Committee support the creation of a Council on Obesity to more fully explore the prevention, management and treatment of obesity and obesity-related health issues in South Carolina. The Committee believes that a Council on Obesity is the most effective way to stop the epidemic of obesity in South Carolina.

Health complications associated with obesity incur significant health care expenditures by the public and private health care systems. All of these complications are preventable or can be diminished significantly. Even moderate weight loss (5-10% of body weight) is associated with improved health benefits. The most current and effective obesity prevention and management programs must be available and accessible to all South Carolinians, especially those at greatest risk.

Effective obesity prevention and management program funding is essential if we are to stop obesity from increasing, improve health outcomes, and reduce health care costs.

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EXECUTIVE SUMMARY

SCOPE OF THE PROBLEM

Overweight and obesity are of epidemic proportions in the State of South Carolina occurring among half of the adult population. In 1998, South Carolina ranked 10th highest in the nation for self-reported rates of overweight and obesity.

Rates of overweight and obesity are highest in minority groups, affecting approximately 65% of African Americans, 51% of Hispanics, and 64% of Native Americans. Minority women and medically under-served communities are at particularly high risk.

Obesity rates in children have doubled over the last twenty years. An estimated one in five children in the U.S. is overweight or obese. Obesity in childhood and adolescence is a strong predictor of obesity and health risks in adulthood.

Obesity is strongly associated with Type 2 diabetes, heart disease, high blood pressure, stroke, some cancers, and a wide range of other diseases affecting our State's citizens. Obese children and adults also experience widespread intolerance and may suffer psychological distress as a result.

COST TO THE STATE

Obesity and obesity-related conditions cost the State of South Carolina an estimated $177 million in 1997.

NEEDS IN THE STATE

Sufficient data are needed to appropriately characterize the problem of obesity, particularly in children and adolescents.

Adequate resources are needed to prevent and reduce the rate of obesity among high-risk populations.

Research is needed to determine which interventions are most effective for specific groups of South Carolinians.

Funding is needed to implement strategies aimed at preventing obesity in children and adults.

SPECIFIC REQUESTS

The Advisory Committee requests legislation to accomplish the following:

- Create a statewide Obesity Council. The Council's purpose is to reduce the prevalence and health-related costs of obesity in the State of South Carolina.

- Allocate $500,000 annually to fund the Council which will implement large-scale prevention and treatment programs, surveillance, and policy development that are essential to impact overweight and obesity in our state.

OVERVIEW OF OVERWEIGHT AND OBESITY

People in the United States are heavier now than ever before (1). According to the National Heart, Lung and Blood Institute (3), an estimated 97 million adults in the United States are now overweight or obese, representing over half of the adult population. Among today's youth, approximately one in five are overweight or obese (2). These overweight children will likely become overweight adults, perpetuating the growing epidemic in this country.

Overweight and obesity contribute substantially to high rates of diabetes, high blood pressure, heart disease, certain cancers (obesity-related risk factors), and other diseases; hence they place an enormous toll on the rising costs of the health care system. The aim of this report is to outline the scope of the problem, estimate the economic impact on the State of South Carolina, and suggest a path by which to reverse, or at least stabilize, the rising trend of overweight and obesity rates.

OVERWEIGHT AND OBESITY DEFINED

The classification of overweight and obesity recently was standardized by a panel of experts based on an extensive review of the literature. Overweight and obesity are determined by calculation of body mass index (BMI). BMI is a measure of weight that takes height into account. It is calculated as weight in kilograms divided by height squared in meters.[1]

[1] Using pounds and inches, BMI = weight in pounds divided by height^2 in inches multiplied by 704.5.

Table 1. Classification of Overweight and Obesity by Height and Weight

Height	**Healthy Weight** (lbs.) **BMI = 19-25**	**Overweight** (lbs.) **BMI = 25 - 29**	**Obese** (lbs.) **BMI = 30 or over**
4'10"	91 - 118	119 - 142	143 or over
4'11"	94 - 123	124 - 147	148 or over
5'0"	97 - 127	128 - 152	153 or over
5'1"	101 - 131	132 - 157	158 or over
5'2"	104 - 136	137 - 163	164 or over
5'3"	107 - 140	141 - 168	169 or over
5'4"	111 - 145	146 - 173	174 or over
5'5"	114 - 149	150 - 179	180 or over
5'6"	118 - 154	155 - 185	186 or over
5'7"	121 - 159	160 - 190	191 or over
5'8"	125 - 163	164 - 196	197 or over
5'9"	129 - 168	169 - 202	203 or over
5'10"	132 - 173	174 - 208	209 or over
5'11"	136 - 178	179 - 214	215 or over
6'0"	140 - 183	184 - 220	221 or over
6'1"	144 - 188	189 - 226	227 or over
6'2"	148 - 194	195 – 232	233 or over
6'3"	152 - 199	200 – 239	232 or over
6'4"	156 - 204	205 - 237	240 or over

Adaptation of National Heart, Lung, and Blood Institute Body Mass Index Chart

The current definition of overweight is a BMI of 25 kg/m^2 to 29.9 kg/m^2, while obesity is defined as a BMI greater than or equal to 30 kg/m^2. (Note: Most national surveys conducted to date have used a BMI of greater then 27 kg/m^2, corresponding to 120% of ideal weight, to define overweight.) Unless indicated, this report uses the most current definitions:

- **overweight = 25 kg/m^2 to 29.9 kg/m^2**
- **obese = 30 kg/m^2 or over**

Waist circumference also can be used in the assessment of obesity. It is a good measure of the presence of excess abdominal fat, which is a predictor of increased risk for the development of obesity-related risk factors in adults with a BMI of 25 to 34.9 kg/m^2 (3).

Table 2. Waist Circumference – High Risk*

Gender	Waist Circumference

Men	>40 inches (or >102 cm)
Women	>35 inches (or >88 cm)

(*for development of obesity-related risk factors)

ADULT OBESITY

Scope of the problem and health implications for adults

Over half of American adults are overweight or obese. The prevalence of these conditions is higher among certain populations including females, ethnic minorities, and individuals with low income and educational levels. Two-thirds of African American women are overweight or obese (3). These facts are of particular importance in South Carolina where, according to the 1990 U.S. Census, over 575,000 individuals live in poverty (15.7%), and about one-third of the population (over one million individuals) are African American.

Overweight and Obesity in South Carolina

National Health and Nutrition Examination Study (NHANES III)

The NHANES III provides the most recent and most accurate estimate of the prevalence of overweight and obesity in the U.S. These data, applied to the adult population in South Carolina (age and race specific), provide useful estimates of the number of overweight and obese individuals in the State (about 1.5 million).

Table 3. NHANES III Estimates of Overweight and Obese Persons in South Carolina

	Men	Women	TOTALS
African American	182,097	261,918	444,015
Caucasian	547,527	480,410	1,027,937
Hispanic	5,990	8,550	11,624
TOTALS	735,614	750,878	**1,483,576**

Behavioral Risk Factor Surveillance System (BRFSS)

- **South Carolina ranked 10th highest in the nation in terms of overweight in 1998.**

South Carolina is consistently among the states with the highest self-reported rates of overweight. (Note: Overweight was defined as a BMI $\geq$ 27.3 kg/m^2 for women and a BMI of $\geq$ 27.8 kg/m^2 for men.) The BRFSS data are self-reported instead of measured. Therefore, the percent of overweight and obese individuals will be underestimated (4). Figure 1 shows the trend of overweight and obesity in the State from 1987 to 1997. As shown, the combined rate of overweight and obesity is high and has increased steadily over the past decade. Much of this rise is due to the increasing rate of obesity rather than overweight. The State's population is getting heavier.

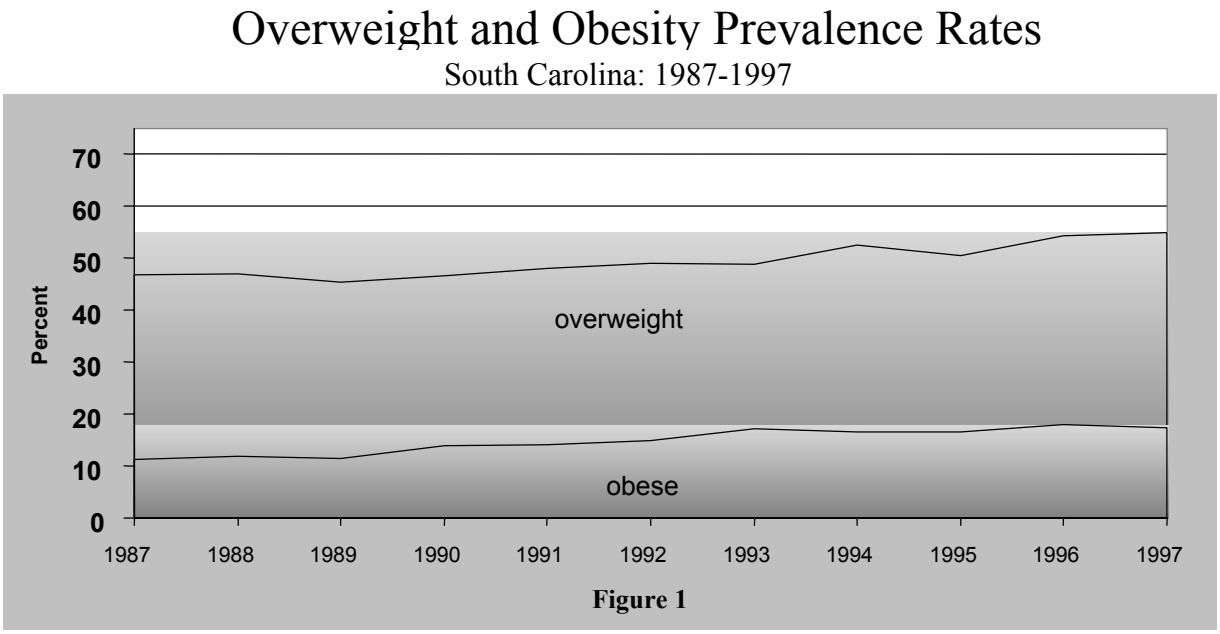


Figure 1

Combining data from years 1993 to 1997 to yield more precise estimates, we find that overall, 36.2% of South Carolina adults are overweight (BMI $\geq$ 25 kg/m^2 and < 30 kg/m^2) and an additional 17.0% are obese (BMI $\geq$ 30 kg/m^2). These rates indicate that less than half of the adult population in South Carolina is of normal weight.

Figure 2 shows age-specific data for South Carolina BRFSS compared with national BRFSS data. For South Carolina and the U.S., rates of overweight increase with age until about age 60. The rate of overweight is higher in South Carolina for every age decade except the 70's.

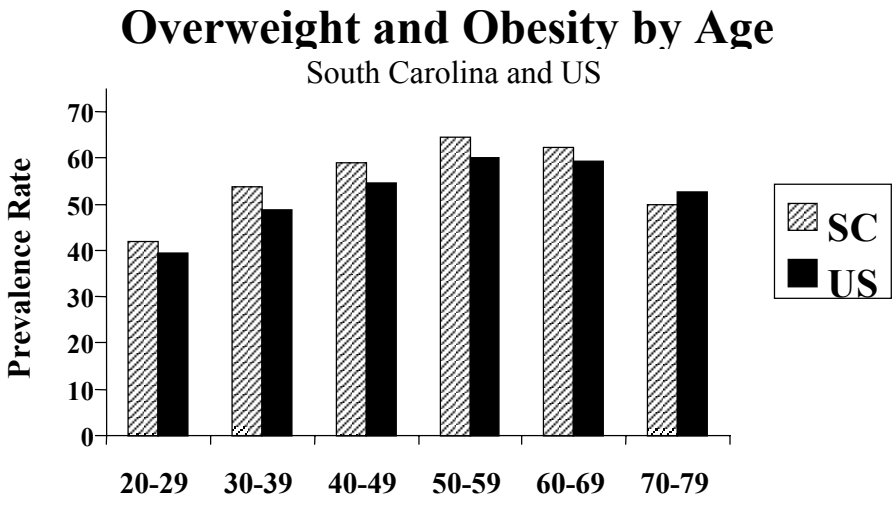


Figure 2

According to the South Carolina BRFSS, overweight and obesity combined are more common among men than women (60.1% versus 46.7%), but obesity is slightly more common among women than men (17.4% versus 16.6%). Overweight and obesity are much more common among African Americans than Caucasians (64.5% versus 49.2%, combined). Figures 2-6 show the rates of overweight and obesity by (a) age, (b) region, (c) adequacy of medical care, and (d) race and gender.

Figure 3 shows that rates of overweight and obesity combined are high (over 50%) in each of the four regions of the State. (See Appendix B for listing of counties in each region.)

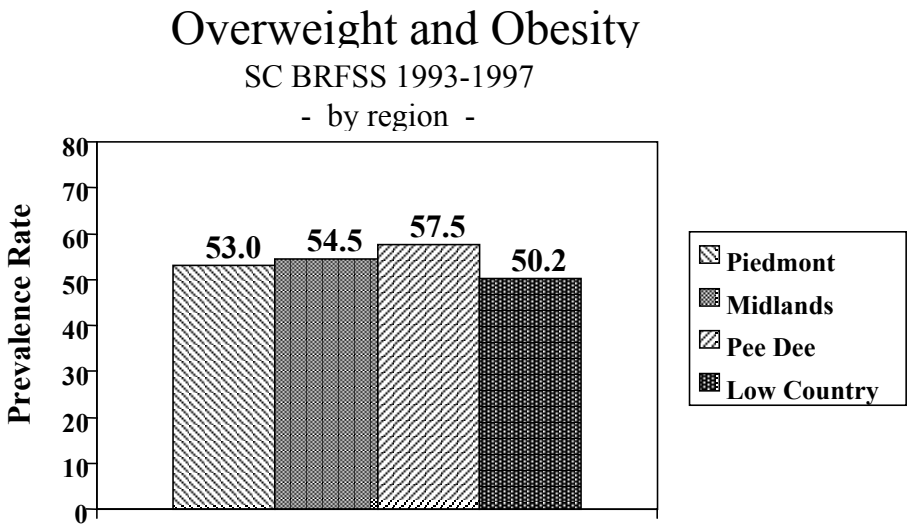


Figure 3

Figure 4 shows that when looking at medically under-served counties[2] as compared to adequately served counties, the rates are higher in the under-served areas (56.3% versus 50.3%), yet again, over half of the population in either situation is overweight.

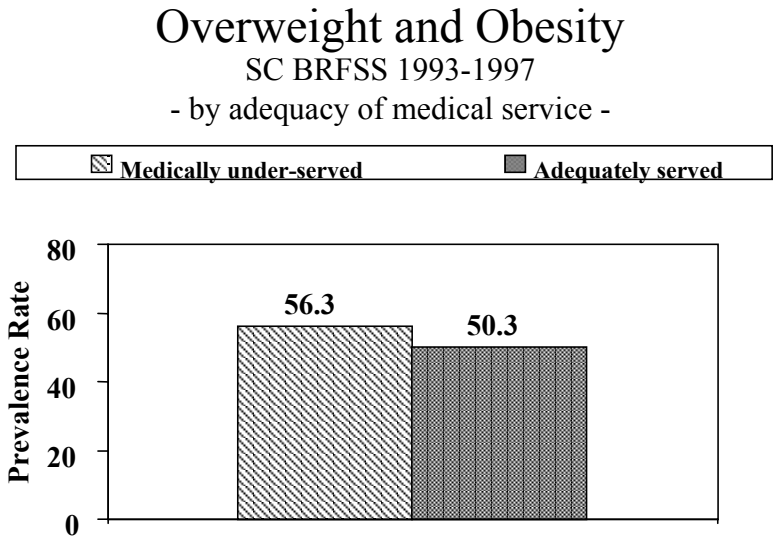


Figure 4

[2] Medically under-served counties were designated as such by the U.S. Public Health Service. The definition was based on physician-to-population ratio, infant mortality rate, poverty level, and percent of population age 65 years or greater.

Figures 5 and 6 show that over two-thirds of African American men and women are overweight or obese. Obesity is particularly high among African American women (30%). Nearly 60% of Caucasian men and 40% of Caucasian women are overweight or obese.

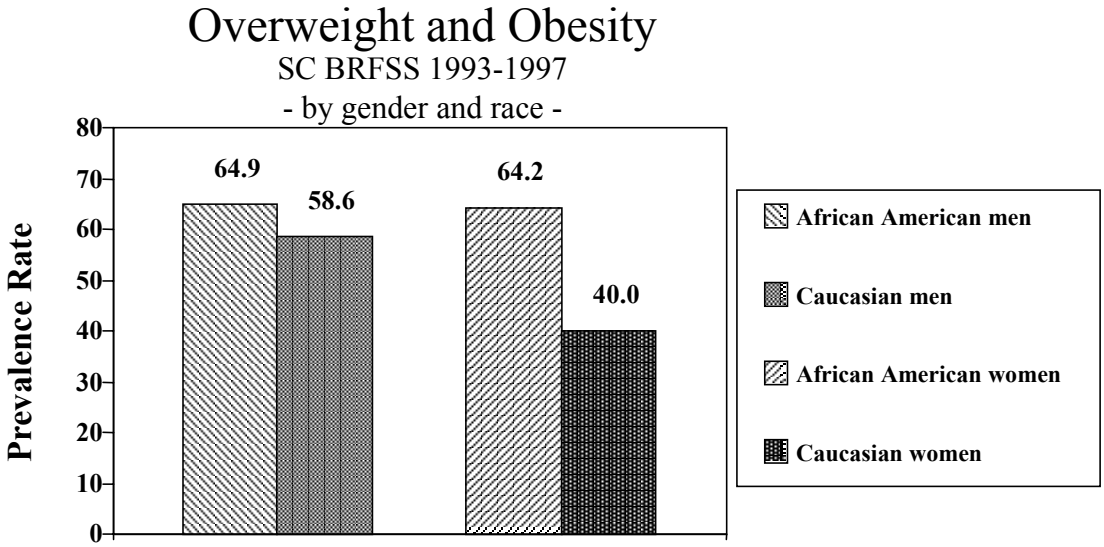


Figure 5

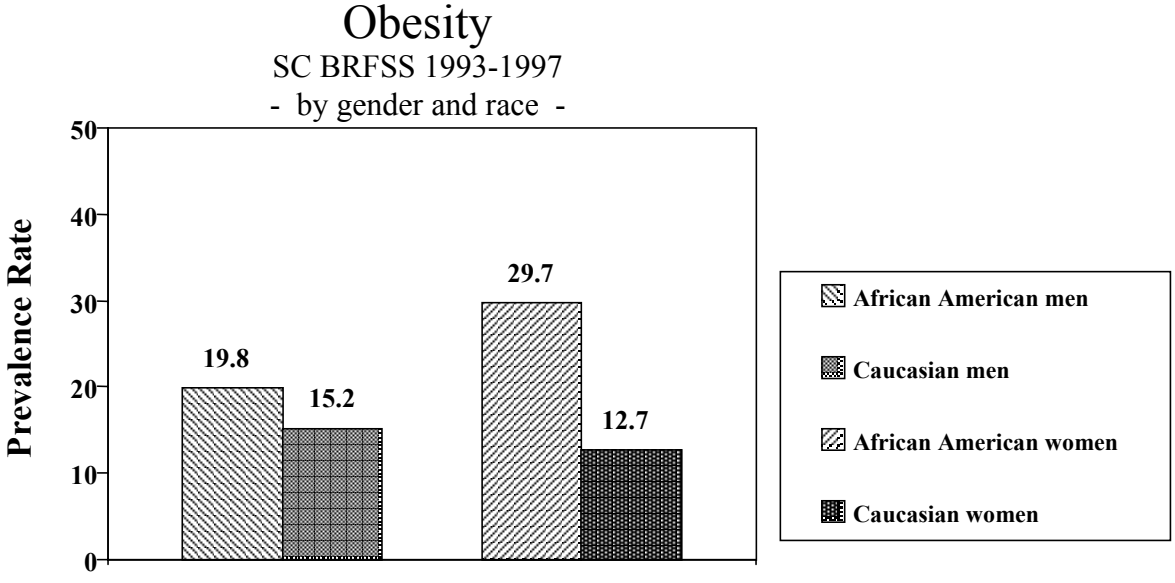


Figure 6

Two other important minority groups in South Carolina are Hispanics and Native Americans. Based on 164 Hispanic respondents to the South Carolina BRFSS (1993-1997), 51.7% were overweight (52.3% of men and 47.7% of women). A more representative picture may be found by applying the national rate to the South Carolina population. From the 1990 census, BRFSS estimates that there are approximately 11,624 of 17, 924 Hispanic adults who are overweight (see Table 3). While the 1990 U.S. Census underreports the number of Hispanics living in South Carolina, the data show that this is an area for concern.

Recently, a survey that gathered self-reported heights and weights from 789 individuals was conducted among the Catawba Indian Nation in South Carolina. It showed that the prevalence of overweight was 64% overall, with a 70% prevalence for men and 60% for women (5).

Health Implications of Overweight and Obesity

As established by the Evidence Report published by the National Heart Lung and Blood Institute (3), the condition of overweight or obesity substantially raises the risk of coronary heart disease, stroke, high blood pressure, unfavorable blood lipid levels, Type 2 diabetes, gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and endometrial, breast, prostate, and colon cancers. The expert panel that published the report based its conclusions on an extensive review of the literature, including approximately 394 randomized controlled trials. The South Carolina report focuses on the three major diseases associated with obesity: heart disease, stroke, and diabetes, since these diseases cause a large majority of death and disability in the State.

Coronary Heart Disease

- **In 1996 South Carolina ranked 3rd in the U.S. in deaths due to diseases of the heart with a rate of 304.2 per 100,000** (6).

The American Heart Association has classified obesity as a major, modifiable risk factor for coronary heart disease (7). It has been estimated that in the U.S., 19% of deaths from coronary heart disease can be attributed to obesity (8).

Key risk factors for heart disease, such as diabetes, high blood pressure, unfavorable blood lipid levels, and stroke are independently related to obesity. The link between BMI and blood pressure was documented over 30 years ago in the well-known Framingham Study (9). Obese people have at least five times greater risk of developing high blood pressure than lean people (10). The link between obesity and unfavorable blood lipid levels is well established, as is the positive impact that weight loss has on lipid levels (11, 12).

Stroke

- **In 1996, South Carolina ranked 1st in the U.S. in deaths due to stroke with a rate of 60.9 per 100,000** (6).

Overweight and obesity have been noted by the American Heart Association as a secondary risk factor for stroke. Excess body weight has been associated with risk for ischemic stroke among women (13). Among males in the Physicians' Health Study, increased physical activity resulted in fewer strokes due to the beneficial effect of physical activity, improved body weight, and other risk factors (14).

Diabetes

- **In 1996, South Carolina ranked 10th in the U.S. in deaths due to diabetes with a rate of 21.6 per 100,000** (6).

Overweight and obesity are risk factors for diabetes, and diabetes is a risk factor for coronary heart disease (CHD) and stroke. Up to 90% of individuals in the U.S. with Type 2 diabetes are overweight or obese (15). In the U.S., it has been estimated that 62% of deaths from diabetes can be attributed to obesity (8).

In Type 2 diabetes, obesity contributes to excess disease and death (16), including increased risk for high blood pressure and cardiovascular disease (17). Furthermore, the metabolic abnormalities of Type 2 diabetes such as high levels of blood glucose and insulin, and unfavorable levels of blood lipids are worsened by obesity (15, 18, 19, 20). Accordingly, Pi-Sunyer (21) has recommended that individuals with diabetes strive to achieve and maintain a BMI of 25 or below. According to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), complications of diabetes, such as amputations, blindness, kidney failure, or gallstones, increase dramatically as BMI increases.

Psychosocial Consequences

Obesity is not a psychiatric disorder, and rates of psychiatric disorders are no greater among community samples of obese persons than among non-obese community samples. However, obese people seeking treatment for their obesity do have a higher rate of such problems; several studies have found that half or more of significantly obese persons presenting for drug or surgical treatment have suffered diagnosable psychiatric disorders in their lifetime. (22, 23, 24)

Obese people often show impairment in behavioral and psychological factors related to eating, weight control and body image. For example, they may experience more pessimism about control of eating, be more aware of suffering hunger, and be more prone to self-defeating perfectionism about dieting. Obese children, adolescents and adults are more likely to experience a negative body image; that is, they may evaluate their appearance quite negatively. General self-esteem is sometimes impaired among obese adults and adolescents (22, 24). Overall, obesity has been documented to produce measurably decreased quality of life (25).

To a striking degree, obesity is also a social disability. Obese people live in a world that receives them with notable antipathy. Numerous studies have documented strong prejudices against obese people by adults, children, and regrettably, even health care professionals. These prejudices are often reflected in outright discrimination in employment, educational, and health care settings. Obesity in adolescence (particularly among girls) has been found to be related to lower educational attainment, income, and likelihood of marriage (22, 24).

Some groups of obese people are more prone to suffer psychological distress as a result of their obesity. These include the more severely obese, obese people with problems of binge eating, and Caucasian (relative to African American) women (22, 23, 26).

Summary of Scope and Health Implications

Over half of South Carolinians are overweight or obese. About 65% of African Americans in South Carolina are overweight or obese, as are nearly 60% of Caucasian men and 40% of Caucasian women. The rate of overweight, and especially obesity, is rising, which will negatively impact the health status of South Carolina in the future. Overweight and obesity are strongly related to coronary heart disease, stroke, diabetes, and many more chronic conditions

that afflict our State. Available data show that the prevalence rates of these conditions are higher in South Carolina than in the U.S. in general.

Approaches for prevention of overweight, obesity, and related conditions

The dramatic rise in the prevalence of overweight and obesity points to environmental rather than genetic factors (27). Social, behavioral, and cultural factors play an important role (3). It has been estimated that diet and activity patterns contribute to at least 300,000 deaths annually, rendering these the second leading cause of death in 1990 (28). There is evidence to suggest that lifestyle changes, independent of weight loss, can help improve many of the most common obesity-related disease conditions such as high blood pressure, unfavorable blood lipid levels, insulin resistance, and glucose intolerance (29). Thus, diet (energy in) and activity patterns (energy out) are of paramount importance in the prevention of overweight and obesity and related disease.

Research indicates that certain populations may be important targets for prevention of weight gain. There may be three time periods for the adult population that are especially important to focus on: the 25 to 35 year age group, the time around menopause, and the year following successful weight loss (30). Interventions in the prenatal and postpartum periods also may be critical to help those at risk of retaining weight gained during pregnancy (31). Other data suggest that African American women younger than 25 years should be a priority target audience (32). The CARDIA study (33) and national surveys indicate that others at high risk include all African Americans and adults with a low education level.

Physical Activity and Diet

Diet and activity are important in terms of prevention and treatment of obesity and obesity-related conditions, such as diabetes and heart disease (28). Primary prevention efforts should include physical activity, changes in the type and quantity of food consumed, behavior modification, and some contact with a counselor (34).

A study of healthy, middle-aged, women in South Carolina showed that those who maintain normal weights appear to do so mainly by increased physical exercise and decreased energy intake. Women with normal weights also demonstrated a sense of responsibility and control over their own health. In this and other studies in South Carolina, it has been shown that women who eat more frequently have lower mean BMIs and body fat percentages than those who skip meals or have longer periods of food deprivation (35).

Very low-intensity approaches may not be adequate to prevent obesity as shown in the Pound of Prevention (POP) Study. The POP found that a low-intensity intervention consisting of monthly educational newsletters was associated with prevention of weight gain compared to the control group and, on average, about two pounds of weight loss during the first year (36). The POP intervention was not strong enough to prevent weight gain over three years even though positive behavior changes persisted (37).

More intensive programs have been shown to be effective in promoting weight loss which can prevent obesity-related disease. For example, the Diabetes Prevention Program (DPP) offers its participants "Lifestyle Balance", which stresses both eating healthy and being more physically active to lose weight and keep weight off. The intervention uses "tried and true" intervention approaches such as goal setting, self-monitoring, and frequent contact with the interventionist. The physical activity goal is set at 700 kilocalories of energy expenditure per

week (i.e., 2.5 hours of moderate physical activity per week). Healthy eating goals include a limit of fat grams per day (25% of calories) and reduced calories per day to result in a weight loss of one to two pounds per week. The physical activity and fat gram goals were determined based on scientific research showing a health benefit at the selected levels (700 kilocalories of energy, and 25% of calories from fat).

It should be noted that aerobic fitness, as a result of high physical activity levels, has been associated with better health even among overweight or obese individuals. Aerobically-fit men who had BMI of 27.8 or greater had death rates similar to those of fit men of normal weight, and lower risk of death than unfit normal weight men (38). Based on this finding and other similar results, researchers concluded that the health benefits of leanness are limited to fit men, and being fit may reduce the hazards of obesity (39). Increased physical activity can improve fitness and offer many benefits in addition to possible prevention of obesity (e.g. improved quality of life, flexibility, motor performance, and increased muscle mass and bone density).

Approaches for treatment of obesity in adults

Adults with obesity-related risk factors should be a primary target for intervention and treatment for weight loss. The initial goal of weight loss therapy is to reduce body weight by about 10% over a six-month period (3). Even moderate weight loss can reduce risk factors for diabetes and heart disease (40, 41, 42, 43, 44, 45).

Physician Counsel

Physicians can play a major role in overweight and obesity management with the patients they serve. It has been suggested that health professionals shift their focus away from the goal of

losing body fat to attain a particular size to focus instead on improving health and well-being for people of all sizes (46). It is important that physicians emphasize the role of physical activity in the treatment of obesity (47), as well as the importance of a proper diet (48). The health benefits of proper nutrition and exercise are significant regardless of body size (49, 50).

Data from the 1996 BRFSS revealed that only 42% of obese persons nationwide who visited their physician for a routine checkup in the last 12 months reported that they had been counseled by a health care professional to lose weight (51). In South Carolina, 10.2% of those who were overweight were told to lose weight by their physician (BRFSS 1995-1997).

A study of family physicians found that they were most likely to use diet, exercise, and behavior modification prescriptions in treating obese patients, and they were reluctant to prescribe medications. The physicians displayed a lack of understanding of the proper assessment of obese patients. Most agreed that their medical school training was deficient regarding the treatment of obesity; a majority wished further training. Most of the physicians surveyed had a desire to collaborate on obesity-related research projects. Additional access to training could make an impact on these attitudes and thereby influence their patient management (52).

Behavioral Approaches to Weight Management

Current behavioral approaches to weight management result in modest weight loss while maintenance of lost weight remains a critical challenge (40, 53). The National Institutes of Health (NIH) Expert Panel recommends that a combination of therapies should be continued indefinitely to increase the likelihood of weight loss maintenance (3). Essential elements of a successful weight loss maintenance program include: frequent and sustained contact with

counselors, low-calorie/low-fat diet, moderate physical activity, use of self-monitoring tools with support from a dietitian, and strategies for relapse prevention and treatment (53, 30).

Since a large percentage of the overweight/obesity problem in South Carolina is among the African American population, culturally appropriate intervention strategies are needed. Kumanyika and Ewart (54) have shown that African Americans have different perceptions of favorable body size compared to Caucasians. The Trial of Non-pharmacologic Interventions in the Elderly (TONE), including about 25% African American participants, demonstrated the efficacy of a comprehensive weight loss intervention that resulted in sustained weight loss over a 30-month period (55). Other groups (56, 57) have reported the success of intensive, culturally sensitive behavioral programs for weight loss among urban African Americans, including those with diabetes (58, 59). On the other hand, some studies showed smaller weight loss among African Americans compared to Caucasians (60) and an increased tendency for African American participants to regain weight (61). While recent studies provide reasonable evidence that weight loss can be achieved among African Americans, it is clear that long-term success will depend on careful attention to the refinement of culturally sensitive materials and to appropriate delivery of these materials.

Leermakers et al. (62) compared an exercise-focused program (including supervised walking sessions, behavioral management techniques, and relapse prevention) with a weight-focused program (group problem solving of weight-related problems). At the end of the 6-month follow-up program, there were no differences in exercise participation or energy expenditure. However, during the year following the initial weight loss, the participants of the weight-focused program ate less fat and maintained weight loss better than subjects in the exercise-focused

program (62). Physical activity alone is not an adequate weight loss strategy, but should be combined with dietary changes and behavior modification to be effective.

Pharmacology

At the present time, pharmacotherapy has a limited role in obesity treatment (63). Drug treatment of obesity is appropriate only in individuals who: 1) are at medical risk from their level of obesity, 2) have not responded to more traditional, conservative management such as diet and exercise, 3) have no contraindications to the use the pharmacologic agent, and 4) understand the risks, likelihood of success, and possible need for long-term treatment to maintain weight loss. Individuals who have been prescribed drugs should be encouraged to reduce caloric intake moderately and exercise regularly (63).

The NIH Expert Panel reported that anti-obesity drugs can augment diet, physical activity, and behavior therapy to achieve and maintain weight loss. Such agents may be a useful adjunct for patients with a BMI $\geq$ 30, or BMI $\geq$ 27 with other obesity-related risk factors or diseases (3). The most recent drugs approved by FDA for use in weight management are sibutramine (Meridia) and orlistat (Xenical). Two recent studies of patients taking orlistat showed that they lost more weight than patients not treated with the drug (64, 65). However, these studies were no longer than one and two years in length. The usefulness of drug therapy in sustaining weight loss over longer periods of time has not yet been determined.

Sibutramine can result in increased blood pressure in some patients and, therefore, should not be used by people with uncontrolled high blood pressure, heart disease, or history of stroke (66). Orlistat, because of its fat-blocking properties, may cause undesirable gastrointestinal discharge and may also block absorption of fat-soluble vitamins.

Examples of programs related to obesity in South Carolina

This section identifies the types of programs and resources that are available to people who wish to lose weight to improve their health. No attempt has been made to judge adequacy or effectiveness of these programs, nor is a mention meant to suggest any endorsement. A comprehensive review of all such programs in the State was not possible, so a sampling of what is available in South Carolina is presented here.

State of South Carolina/ Department of Health and Environmental Control
Public Health Nutrition

Nutrition counseling and medical nutrition therapy are available for overweight or obese clients through two public health nutrition programs in the local health departments.

Special Supplemental Food Program for Women, Infants and Children

Overweight and obesity are criteria for referral to nutrition services in the Special Supplemental Food Program for Women, Infants and Children (WIC). WIC provides nutrition education and counseling to pregnant, breastfeeding and postpartum women, and infants and children up to age five who are at medical nutritional risk and meet the income guidelines of the program. Women and children are required to receive nutrition education and counseling related to their medical risk a minimum of two times during the certification period. Registered dietitians, nutritionists, or nutrition education specialists provide nutrition services.

Preventive and Rehabilitative Services for Primary Care Enhancement

Designed to support primary medical care services, Primary Care Enhanced Services offers counseling for weight management to Medicaid clients. Clients are identified for Enhanced Services through the assessment process, self-referral, or through referral by other

service providers (Department of Social Services, Early, Periodic, Screening, Diagnosis and Treatment Program providers, etc.). For example, a diabetic who is overweight is eligible to receive the services of the registered dietitian through a referral from the health care provider or at the request of the individual.

An initial assessment is performed to determine if preventive or rehabilitative interventions are necessary. After the assessment is completed, an initial service plan is developed to address the identified risk factors based on the findings in the assessment.

Preventive or rehabilitative services are provided to clients exhibiting risk factors that directly impact their medical and health status. Preventive interventions are designed to enhance the individual's medical plan of care and practice of healthy behaviors, prevent deterioration of chronic conditions, and promote full and appropriate use of primary medical care. Rehabilitative services enhance the individual's medical plan of care, promote changes in behavior, improve health status, and develop healthier practices to restore and maintain the individual at the highest level possible.

Health Care Industry

Health care organizations that offer weight loss programs are medical university facilities, hospital-based programs, clinics devoted to weight loss, and individual physician offices that specialize in weight management. A sampling of the medical university, hospital, and clinic-based programs are described here. Many of the hospital and clinic programs were started in 1999.

Medical University of South Carolina (MUSC)

MUSC Weight Management Center

The staff at the 25-year-old MUSC Weight Management Center consists of psychologists, physicians, dietitians and exercise physiologists who work together to address the complexity of weight loss. Their team approach offers help to set up an exercise program, form a life-long, healthy eating plan, examine and change problematic eating behaviors and thought patterns, and establish emotional support through group and individual sessions. This 20-week program called "First Step" addresses all of these components.

A program for people who need to lose more than 50 pounds is the "HealthFast" program, a 30-week itinerary that involves initial supervised supplemental fasting, along with lifestyle change counseling. Other programs include "Medication Plus" which makes weight loss medications available to patients not in other programs. Consultation services are also available for individual weight management, or for separate program components such as body composition assessment, nutrition consultation or exercise consultation.

MUSC Pediatric Weight Loss Clinic

This multidisciplinary weight loss program is specifically targeted toward morbidly obese children. It receives patient referrals from throughout the region and focuses on treating children with immediate medical complications of their obesity such as sleep apnea, high blood pressure, Type 2 diabetes, and unfavorable blood lipid levels. In addition to three pediatric endocrinologists, the clinic is staffed by two registered dietitians, two nurse managers and a nurse practitioner. A variety of dietary interventions are utilized including protein-sparing modified fast (ketogenic).

MUSC Gastric Bypass Surgery Program

For six years, MUSC has offered a multidisciplinary program designed specifically for the treatment of patients who are morbidly obese, who have failed a major weight loss program, and who have obesity related risk factors or diseases, such as diabetes and high blood pressure. All patients are evaluated by a psychology team from the MUSC Weight Management Center and a dietitian. Approximately four new patients are evaluated every week, and about 40 patients undergo the surgery each year.

MUSC Eating Disorders Program

A small but important percentage of obese persons suffer from eating disorders. In many cases these disorders must be treated before a structured weight loss program should be started. The multidisciplinary Eating Disorders Program offers outpatient and day treatment services for such individuals based on treatment methods developed during the 10+ years of the program's existence.

MUSC Division of Endocrinology, Diabetes, and Medical Genetics

The Endocrine Division staffs several clinics that serve obese patients with and without diabetes.

McClennan-Banks Ambulatory Care Facility. This is an outpatient primary care facility associated with Charleston Memorial Hospital. Obese patients are followed either in the primary care clinics or in the Endocrinology Subspecialty Clinic. This patient base has a high percentage of patients on Medicare/Medicaid. The Endocrinology Subspecialty Clinic provides 1,700 visits per year. Sixty-three percent of patients seen in the clinic have obesity or Type 2 diabetes.

Rutledge Tower. This outpatient care facility of MUSC follows obese patients in three programs. The Private Diagnostic Clinic sees 6,500 outpatient visits per year. Obesity and Type 2 diabetes are the most commonly diagnosed conditions at this clinic. The Cholesterol Center follows patients with obesity, diabetes, and/or a variety of blood lipid diseases, and the IDEAL Program follows diabetic patients who are a part of the Epidemiology of Diabetes Intervention and Complications (EDIC) trial.

The Endocrine Clinic at the Veterans Affairs (VA) Hospital. This clinic provides 1,200 patient visits per year and includes the treatment of obese patients.

Hospitals

Lexington Medical Center Health Directions offers a twelve-week program called "Live Light." It focuses on improving eating habits and developing a healthy lifestyle through pre- and post-assessments, meal planning, exercise classes and educational instruction. Program sessions begin several times throughout the year and the cost is $19 per week with a $75 initial deposit.

Kershaw County Medical Center's Health Resource Center offers "Why Weight?" classes four times a year. The eight-week long classes are for adults only and measurements of weight, blood pressure, and cholesterol are done before and after the classes.

Self Memorial Hospital in Greenwood offers a weight loss program that consists of two 30-90 minute sessions scheduled at the convenience of the participant. Sessions include education on nutrition, meal timing, activity (which includes the opportunity to join their fitness center), and the importance of lifestyle change.

Georgetown Memorial Hospital offers an eight-week weight loss program that costs $99. Participants attend nutrition classes taught once a week by a registered dietitian. They also have

body fat measured and meet twice a week for 30minute sessions with an exercise physiologist. The hospital conducted follow-up visits within a year of starting the program.

Carolina Hospital in Florence has developed a program called "Exercise And Sensible Eating (EASE)." This eight week set of classes takes a non-diet approach and works on developing skills in proper exercise and fitness, nutrition knowledge, and healthy food-related behaviors. BMIs are calculated and skinfold measurements taken to determine percent body fat. Class members are given a fitness test and have two personal exercise training sessions. Nutrition is taught in classes the first four weeks and then in two more one-on-one sessions. In addition to nutrition knowledge, issues such as hunger versus fullness, intuitive eating and self-esteem are discussed. Follow up is done once a month in weight management classes. The program costs $150 for members of Fitness Forum (a fitness center), and $250 for all others.

The Loris Community Hospital has a series of eight-week classes throughout the year called "Shape Up." Weekly nutrition education sessions cover topics such as fad diets, cooking light, eating on the go, stress, and avoiding relapse. The exercise portion of the classes includes stretching, strengthening, and cardiovascular workouts. Cost for members of the fitness center associated with the hospital is $25-30 and $40-50 for the general public. Support groups are available after program completion.

Clinics

A facility that focuses on weight loss treatment is the Metabolic Medical Center in Greenville. The clinic is staffed by physicians and a complete medical work-up is performed on patients. This includes a physical with blood work and EKG to see if any internal problems are causing the weight gain. Weight loss is initiated through diet changes with a focus on decreasing

the amount of simple sugars consumed while maintaining protein levels. Exercise is encouraged after the initial stages and patients are referred to a health club for individualized attention. Patients are seen one to two times a month while losing weight, then once every three months after maintenance weight level is reached. The program costs $125 for the first visit, then $75-150 per visit depending on the program they are following.

The Urgent Care weight loss clinic in Greenwood conducts the "Color Me Well" program for adults and children. They facilitate weight loss initially through medication (except for children) to increase motivation through early success. Medications are given for 30 days to start, stopped for two weeks, then started again. Liver function tests are taken to monitor medication effects. Nutrition education is offered through classes and counseling with a registered nurse and a physician. Walking is encouraged and weights are taken each week. Medications then are discontinued and making healthy eating a lifetime habit is emphasized. Follow-up visits after the program is completed are recommended. The cost is $60 at the first session and $30 at each subsequent appointment.

Health Insurance Industry

No weight loss programs nor adjuncts, including counseling, surgery, pharmacotherapy or other treatments, are currently covered by the major health insurance providers in the State. They do, however, offer some weight management programs to plan members. The companies listed below represent a majority of the health care coverage in the State.

Companion HealthCare (BlueCross BlueShield)

The "Great Expectations for Weight Management" program is designed to reach members throughout the State. Participants initially are given education materials covering

healthy eating, behavior modification, exercise and weight maintenance. They set goals for weight loss and exercise, track their progress, and participate in weekly telephone counseling sessions. Since the program began in 1993, 1,573 members have enrolled in the program and their average weight loss has been eight to ten pounds.

HMO Blue (BlueCross BlueShield)

The "Your 1st Place for Healthy Weight" program is available for members who wish to lose weight and is encouraged for members with diabetes that is aggravated by extra weight. It is a twelve-week program providing educational materials on eating wisely, exercise, making lifestyle changes, avoiding relapses and staying motivated. Telephone counseling sessions are held to regularly check progress, discuss problems and answer any questions.

CIGNA HealthCare/ Healthsource South Carolina, Inc.

Healthsource has developed "Working Wonders," a wellness program that encourages their members to live more active and healthy lives. The program is designed so people of all ages, abilities and fitness levels can participate if they are enrolled in certain benefit plan designs. The member chooses an exercise activity, such as walking, biking, swimming, running, aerobics, or a combination of different activities. The key is for members to choose something they enjoy doing that works best for them, since that's what they will stick with over time. Whether they work out at home, work, or a health club, members covered under certain Healthsource plans are eligible to earn a variety of fitness and wellness prizes.

Worksite

Colonial Life & Accident Insurance – A UnumProvident Company

Colonial strives to make health promotion a part of the work environment and believes they reap benefits from having employees who feel good about their health and themselves. Recent studies done by the company have shown that for every one dollar invested in the wellness program there is a $2.75 return. Their "Wellpower"program, which recently celebrated it's 15th anniversary, has a comprehensive design that includes components to address nutrition, physical activity, and weight loss for its employees, spouses and retirees.

Weight loss is dealt with specifically by a 12-week program provided at lunch that follows the Weight Watchers format. Quarterly Lunch-n-Learn seminars also are given on topics such as healthy eating and healthy grocery shopping tours. Nutrition booths are set up periodically at different locations in the company with visual displays to educate employees about fat content of foods and other nutrition topics. The company cafeteria is required to have one healthy entrée per day and other healthy foods available such as fat free dressing, fresh fruit, skim milk and frozen yogurt. Twenty-five percent of the items in the vending machines are low in fat and sugar. A health newsletter sent home bimonthly to all employees and their families includes information on a variety of nutrition and physical fitness topics.

Physical activity is available to employees through many programs and equipment at the 8,000 square foot on-site fitness facility. Approximately 65% of employees are members of the facility. Aerobic exercise, indoor cycling, corporate track team, Healthy Behavior Incentive Program (rewards for exercise and healthy behaviors) and other programs are available along with participation in community fitness events.

State of South Carolina

The State Health Plan Prevention Partners has developed three programs that can be used by State agencies or school districts to help employees deal with excess weight. The first, "The Great Weight Maintenance Marathon", addresses healthy eating and exercising during the holidays. Employees set weekly exercise goals and identify situations that may cause extra eating and how they will handle them. They are provided with recipes, tips for eating, and suggestions on how to handle holiday stress.

A second program, "Fall Into Fitness", is a healthy lifestyle incentive exercise program. This is a four-week workplace activity that promote aerobic exercise through use of door prizes, team competitions, and/or a "buddy system." Participants are educated on fitness activities and must keep track of the time they exercise. To win prizes they must meet the minimum criteria of exercising aerobically three times per week for 30 minutes each time. Awards are given weekly and the criteria for winning can vary from department-with-the-most-participants to drawing from names of all who exercised five or more days a week.

The "Challenge" program is designed to enable employees to concentrate on health improvement in the areas of fitness, nutrition, and stress management. Employees earn points by engaging in specific behaviors listed under these categories. Awards based on points earned are given and each agency can determine their own design for implementing the program.

There are over 1,200 worksites registered with the State Health Plan Prevention Partners. Each facility has a volunteer coordinator who receives information each month from the Prevention Partners. The coordinators select the type of wellness activities to implement at their worksites.

MUSC Weight Management Center

The Weight Management Center conducts an eight-week worksite program for companies of various sizes that is called "Team Up to Trim Down." In this program teams formed among employees enter into a competition for meeting weight loss goals. Those who wish to participate pay a fee which goes into a prize fund to be awarded to the team that comes closest to meeting its weight loss goal. The Center provides instruction in weight loss strategies and additional educational materials for each week and phone consultations during the course of the program.

BlueCross BlueShield of South Carolina

This insurance company has over 10,000 employees statewide who can participate in a weight management program called LEARN (Lifestyle, Exercise, Attitude, Relationships and Nutrition). This eight-week program was designed by a weight loss and nutrition professional at Yale University and is facilitated by trained health educators. Offered twice a year at various sites, the classes cover the multifaceted components of behavior change, lifestyle, attitudes, relationships, exercise and nutrition. Participants pay $25 to cover the cost of materials.

Milliken and Company

Milliken, a textile and chemical manufacturer, is an employer of over 8,000 employees statewide. It has an onsite Fitness and Health Center that serves 1,200 employees at its research center in Spartanburg. The fitness center offers employees opportunity for exercise through personal workouts or classes in aerobics, body shaping, weight training or walking. The company provides incentives to help employees remain committed to physical activity.

Weight loss is addressed directly during the holidays in a one-on-one program that lasts for three months. Nutrition topics are presented through bulletin board displays, handouts, and information stands in the cafeteria. Low fat meals or other reduced fat alternatives also are available in the cafeteria.

Community-Based

Churches

Weight loss has become a part of some programs promoting healthier lifestyles in church settings. The African Methodist Episcopal Church Cancer Prevention Education Program sponsors presentations that teach skills for adopting a healthy lifestyle. Nutrition discussions include limiting portion sizes, decreasing fat and concentrated sweets, and increasing fruits and vegetables. Demonstrations show low fat cooking of traditional recipes, and increasing physical activity is emphasized. As a result, people in the program have lost weight even though weight loss is not a focus.

Other church programs focus on weight loss to a greater degree. "First Place", a Christ-centered health program which emphasizes Bible study, scripture memory, prayer and exercise, while following a healthy eating plan. Started by the First Baptist Church in Houston, this health and weight management program is available for implementation in any church. Approximately 290 church groups in South Carolina have ordered "First Place" Program materials. Upon entry into the program, members agree to specific commitments and follow a fitness and Bible study plan. Weekly meetings stress food planning, scripture study and prayer are discussed. The "Live-It" Food Plan used is based on the USDA Food Pyramid, and behavior-modification techniques are also employed. The cost to each member is $80.

The "Weigh Down Workshop", another Bible-based program is available to any denomination, but has a more specific emphasis on weight loss. Started by a registered dietitian, twelve-week seminars are offered that primarily deal with behavior modification and separating physical from spiritual needs. Groups continue to meet weekly largely in church settings. Cost to participants is around $100.

"Lighten Up (Forever)" is a church-based lifestyle intervention program that is funded by the Healthy South Carolina Initiative and designed and implemented by an MUSC team of a doctor and dietitian. The program consists of assessment for cardiovascular risk factors (such as elevated weight, blood pressure, and cholesterol) before the program begins, then eight weekly sessions, and reassessment at 10 and 52 weeks. Approximately 300 individuals, predominantly African American, have completed the ten-week assessment and 100 subjects have completed the 52 week assessment. Community lay leaders have been trained to conduct the program and it is expanding to churches throughout South Carolina and other Southeastern States.

Neighborhood program

The Enterprise Community is an inner-city area in Charleston that is home to 22,000 persons, more than 80% of whom are African American. The Enterprise/ MUSC Neighborhood Health Program and Enterprise Clinic have been funded by HUD and MUSC to help the neighborhoods in this area develop and implement an action plan for priority health issues. The following health priorities were identified by focus groups and individual interviews with neighborhood residents: 1) primary prevention including weight control, nutrition, physical activity, and safety, 2) diabetes management, supplies, and education, 3) high blood pressure management and education, and 4) drug and alcohol programs. In response, the Enterprise/

MUSC Neighborhood Health Program established a community-based team (nurse, dietitian, pharmacist, community education and neighborhood liaison) that conducts neighborhood clinics, education sessions, and provides case management for residents.

Other programs

The YMCA, Overeaters Anonymous and TOPS (Take Off Pounds Sensibly) are non-profit, community-based organizations that have programs available to support weight management efforts.

CHILDHOOD OBESITY

Scope of the problem and health implications for children

Childhood obesity is rapidly emerging as a global epidemic that will have profound public health consequences as overweight children become overweight adults (67). Currently, at least one in five children in the U.S. is overweight or obese and there is a continuing upward trend (68). More specifically, based on BMIs calculated from the NHANES III, 22% of youth aged 6 to 17 were above the 85th percentile of which 10.9% were above the 95th percentile (2). Over the last 20 years the number of overweight children has increased by more than 50% and the number of extremely overweight children has nearly doubled (68). This public health epidemic among youth is not confined to any specific age, race, nor gender group (69).

Childhood obesity is associated with obesity during adulthood, and obese parents are more likely to have obese children. A British study showed that the chance of being obese at age 33 was over eight times higher for sons and almost seven times higher for daughters who had both parents who were obese compared to those with both parents with normal weights (70).

Furthermore, parental obesity more than doubles the risk of adult obesity even among non-obese children under ten years of age (71).

South Carolina Rates of Overweight and Obesity among Children

Rates of overweight and obesity are not well documented among children in South Carolina. Applying national rates from NHANES III to the South Carolina youth population, we would estimate that:

- **136,864 youth aged 6-17 years are overweight and 67,810 are obese.**

While studies of select groups of children have been conducted by the USC School of Public Health, these data are not representative of the whole State. In one study conducted among 518 African American students enrolled in Richland One School District middle schools, 38.5% of the students were overweight (17.9% overweight and 21.6% obese) (72).

In 1999, the South Carolina Youth Risk Behavior Survey (YRBS) assessed height and weight by self-report among high school students. From these data, the proportion of students who are overweight (at or above the 85th percentile but below the 95th percentile for BMI by age and sex) is 14.6% and the number who are obese (at or above the 95th percentile for BMI by age and sex) is 10.7%. This gives a total of 25.3% of high school students who are overweight or obese.

The YRBS survey also gave information on diet and physical activity. A majority of students reported eating fruit or potatoes one or more times in the past seven days (79% and 64% respectively), but only 57% reported eating a green salad, 35% eating carrots, 18% eating five or more servings of fruits and vegetables, and only 12% drinking three or more glasses of milk per day one or more times in the past seven days. Only half of the students (55%) said they

exercised or participated in physical activities for at least 20 minutes that made them sweat or breathe hard on three or more of the past seven days. Almost as many students (52%) reported watching two hours or less of television on an average school day and only 18% said they attend physical education class daily.

Based on data from the Special Supplemental Food Program for Women, Infant and Children (WIC), the rate of obesity does not appear to be above average for South Carolina children who are ages one to five (4.2% are at or above the 95th percentile). These data suggest that children are gaining weight after their fifth year; however, this was a selective sample that was measured.

Health Implications of Overweight and Obesity among Children

Overweight and obesity among children are the leading causes of pediatric high blood pressure, and put children at high risk for developing long-term chronic conditions such as adult-onset diabetes mellitus, coronary heart disease, orthopedic disorders, and respiratory disease (69). Obesity in childhood and adolescence also is associated with psychological problems such as depression and negative perceptions of oneself, one's peers, and one's parents (73).

Among participants in the Bogalusa Heart Study, overweight school children were 2.4 times as likely to have an elevated cholesterol level. They also were more likely to have high diastolic blood pressure, high systolic blood pressure, high LDL-cholesterol, low HDL-cholesterol, high triglycerides, and high fasting insulin levels. Over half of the overweight children (58%) had at least one risk factor for heart disease (74).

Obesity is a known contributor to Type 2 diabetes. As our country is becoming heavier, the age of Type 2 diabetes onset is getting younger. In a Cincinnati study, data showed that prior

to 1982, 4% of the diabetes cases in children 0 to 19 years of age were Type 2. By 1994, 16% were diagnosed as Type 2 (75).

Several longitudinal studies have shown that overweight in childhood is predictive of higher rates of disease and death in adult years:

- Subjects aged 13 to 18 years of age were measured between 1922 and 1935 as part of the Harvard Growth Study. When followed up in 1998, overweight during adolescence was associated with increased heart disease in both men and women and increased death among men. Risk of colorectal cancer and gout increased for men while risk of arthritis was increased for women who were overweight during their adolescence. Furthermore, overweight in adolescence was a more powerful predictor of these disease outcomes than overweight in adulthood (76).
- From 1933-1945, 13,146 children between 5 and 18 years were measured for height and weight. Later follow-up indicated that the chances of death at an earlier age increased with high weight before puberty for both sexes, and for high weight after puberty for women (77).
- Over 500 overweight children aged 2 months to 16 years were followed for 40 years. Overweight children remained overweight as adults, although after age 55, BMI began to decrease. Subjects who died by the 40-year follow-up and those who reported having CVD were significantly heavier at puberty and in adulthood than were healthier subjects. In addition, there was a marked increase in BMI between post-puberty and 25 years among those who died, those who developed CVD, and especially those who developed diabetes. In contrast, those with cancer had lower BMI throughout adulthood than those who did not have cancer (78).

Approaches for prevention of overweight and obesity in children

The dramatic rise in the prevalence of overweight and obesity among children points to environmental rather than genetic factors. Children today eat jumbo-sized fast foods and engage in hours of sedentary behavior daily. A study conducted among three to four year-olds found that children who increased their fatness level over four years consumed more grams of fat, a higher percent of calories from fat, and more total calories than those who did not (79). To prevent obesity in children, initial efforts should be targeted to obese parents of very young children based on the increased likelihood of obesity persisting to adulthood (68).

The International Obesity Task Force concluded that the prevention of weight gain is easier, less expensive, and more effective than treating obesity after it has fully developed (80). The focus of prevention is to reduce exposure to the environmental causes of obesity. Prevention programs can be school-based, family-based, community-based, church-based, health care-based, etc. A combination of approaches increases chances for success.

The Secretary of the U.S. Department of Agriculture (USDA), Dan Glickman, spoke of the opportunity for the federal and state governments to intervene by reducing the fat content in school lunches (the federal government serves 26 million school lunches daily) and by teaching nutrition education in schools. These interventions are a part of Team Nutrition, a federal program set up in 1995 to assist states with the implementation of the USDA School Meals Initiative for Healthy Children. This initiative overhauled the School Lunch Program in 1997 requiring that fat be reduced to less than 30 percent of calories and that school meals meet the U.S. Dietary Guidelines. Team Nutrition has developed nutrition education materials for schools to teach kids healthy eating and to help school food service professionals prepare meals that meet the required nutritional goals (68).

Secretary Glickman also spoke of increasing opportunities for physical activity in children. Schools need to give more time for exercise and federal assistance programs such as WIC, a Special Supplemental Food Program for Women, Infants and Children which serves 7.5 million people, 80% of whom are children) and USDA after-school programs could emphasize regular physical activity (68).

It also should be noted that the USDA's Food Nutrition and Consumer Services delivers food stamps to 9 million households or 22 million people of whom 60% are children; and the federal government distributes billions of pounds of commodity foods every day. Because of the number of households reached through these programs, they provide ample opportunities or access points for incorporating education on nutrition and physical activity for program participants (68).

These governmental programs offer an excellent avenue for obesity prevention since: 1) they serve low income individuals, 2) low income groups tend to have higher rates of overweight and obesity than more economically advantaged groups, 3) obese parents are more likely to have obese children, and 4) they serve millions of children daily.

Use of leisure time can also impact weight status in children. There is a direct relationship between television viewing and obesity in children (81). Based on a nationally representative sample of youth aged 10 to 15 years, the odds of being overweight were over four times greater among those who watched five or more hours of TV per day compared to those who watched zero to two hours. Additionally, the odds of becoming overweight during a four-year period were over eight times greater among the high TV viewing group (81). An interdisciplinary intervention over two years (grades 6-8) focused on decreasing television viewing, decreasing consumption of high-fat foods, increasing fruit and vegetable intake, and

increasing moderate-to-vigorous physical activity in order to prevent and/or decrease overweight. The program was most effective with girls. Obesity was reduced by 50% in girls and they were less likely to regain weight. Only TV viewing hours were reduced among boys in the intervention group compared with the control group. Among girls in the intervention group, there was reduced TV viewing, increased fruit and vegetable consumption and a smaller increment in total energy intake as compared to girls in the control group. Reductions in TV viewing predicted obesity change. Among girls, each hour of reduction in TV viewing predicted reduced obesity prevalence (82).

Approaches for treatment of obesity in children

Programs to treat childhood obesity are not commonly available, and usually are unsuccessful at maintaining weight loss. The following recommendations for treating obesity in children based on a ten-year follow-up study have been made: 1) parents must have an active role in the treatment program, 2) exercise is the key to long-term weight control in all obesity programs, 3) the family's environment and behaviors must be targeted, and, 4) specialized training in childhood behavior modification needs to be provided when treating the entire family (32).

Successful programs may depend on reaching the parents of young children. Pediatricians need to educate parents of the dangers of over-feeding and provide them with weight and height statistics. Family eating patterns contributing to obesity need to be recognized and modified – all members of the family must be involved. An assessment of the family's readiness to change is recommended as a first step in designing a mode of treatment (83).

There are a few examples of successful programs with one element in common, that is, the programs used multiple approaches to treat obesity. The Multidisciplinary Four-Phase Approach was successful in producing positive changes in body weight, insulin and cholesterol levels, arterial blood pressure, and levels of self-esteem and depression. The program utilized nutrition education, exercise, and behavior modification (84). Another one-year weight reduction program was successful in producing changes in weight, percent of ideal weight and percent body fat among all 87 children (39 males and 48 females, aged 7 to 17 years). The interdisciplinary approach included diet, nutrition education, behavior modification and exercise (85).

Weights of overweight children could be kept lower over a 10-year period after effective interventions involving parent and child (86). Epstein and colleagues found that involving the parents in the weight loss effort of the children has a large effect on long-term change (87).

Unique issues must be considered when designing weight management approaches for adolescents. Treatments that encourage weight loss for teenagers must be sensitive to possible tendencies for the use of unhealthy or improper techniques. Efforts to lose weight are common among teenagers, especially girls (88). Anorexia nervosa and bulimia are eating disorders that can result when dieting turns into the use of self-destructive weight loss techniques. Health care professionals who are treating obese teenagers need to be able to recognize which individuals may be emotionally and psychologically vulnerable to developing eating disorders.

Examples of programs related to childhood obesity in South Carolina

Schools

As Secretary of Agriculture Dan Glickman discussed, schools can help obese children by providing access to healthy foods and physical activity.

Each of the 87 school districts in the State of South Carolina has the responsibility to provide meals that meet the federally required nutritional goals of the School Meals Initiative for Healthy Children. In general, these goals are to reduce fat and sodium, increase fiber and provide adequate amounts of calcium, vitamin C, vitamin A and iron. Food service personnel plan and analyze meals so that averaged over a week's period of time, the meals meet the nutritional guidelines. The Office of School Food Services, in the South Carolina Department of Education, reviews the menus of each school district every five years to assess compliance.

The biggest barrier to providing healthy meals in schools in South Carolina is the availability of "competitive foods" or foods provided by vending machines on the school grounds. These exist primarily in high schools and the money generated often funds the schools' activities programs. Obstacles to children eating school food at all grade levels include cost restraints, finding healthy foods that kids will eat, scheduling sufficient time to eat, peer pressure, and social stigma associated with eating school food.

The State of South Carolina requires elementary and middle schools (kindergarten through eighth grade) to offer physical education (PE) classes, but there are no statewide, defined minimums for the number of minutes required. The length of time spent in PE classes is determined by the local school district and can vary widely. On average, elementary students probably spend about 50 minutes a week in PE classes in South Carolina. High school students are required by the State to take a full year of PE to graduate. Accountability of schools in providing adequate curriculum quality for different subjects is assessed by the school's "report card." Including physical education and health on the report card will ensure that schools give priority to these areas. The proposed list of curricula to include on the accountability report cards currently includes these subjects.

Other programs

The John Morrison White Clinic at the University of South Carolina at Lancaster works with overweight children in a program called "PLAY (Positive Lifestyles and Activity for Youth)." Children are referred to the program by area pediatricians. The entry criteria include being 6 to 10 ten years of age and having a BMI greater than the 85th percentile of NHANES I. The initial phase is a four-week program of supervised exercise and nutrition education, as well as a workshop for their parents. Body composition, dietary intake and aerobic fitness are assessed during the four-week session or shortly thereafter. Following this initial phase, the children are brought back in six months for reassessment of body composition and dietary intake.

Two sessions have been conducted to date with 12 participants in the first session and ten in the second. Their results will determine the format to be used in the future. It is possible that requiring less time commitment, such as with a biweekly support/educational program for the children and parents, may increase participation. Currently there is no cost for the program, but a fee may be charged or grant funding will be sought to cover fees after preliminary data are in and the final format of the program has been decided.

In the Appalachia I Health District, DHEC has a ten-week weight management program called “Just Do It” for children ages 6 to 12. Referral from a pediatrician is needed prior to enrollment and an appointment is set for the child and his/her caregiver for conducting a psycho-social and nutritional assessment. Participants initially are given materials to help them plan the food they will eat, record what they actually eat, and assess their food habits. They also receive a chart to track physical activity. In the classes, nutrition and psycho-social topics are discussed each week with children and parents or caregivers in their separate classes. A “Food of the

Week" is made in class by the participants each week. The last 30 minutes of the class are spent exercising with a certified aerobics instructor. After the ten-week program, the "Just Do It for Life Maintenance" program is available as a once-a-month support group for participants. Children who continue to participate in this group appear to do well at maintaining their weight loss. Many children in the area do not have access to other physical or social activities and appear to enjoy going to the class. A key to the children's success is the commitment of their parents or caregivers to the goals of the program.

The Greenville County Health Department, in collaboration with the Greenville Hospital System, offers a weight management program for children aged 8 to 15 years called "KIDS IN MOTION." It is funded through a grant from the Greenville Hospital Foundation and is available to all children regardless of income. Some families pay the registration fee, some fees are billed to Medicaid, and some children attend on a scholarship through the foundation. The program consists of one and one-half hour long sessions, one night a week for eight weeks. The three components of exercise, nutrition education, and behavior modification are taught in one half hour sessions by a specialist from each discipline.

The Sumter Family YMCA "Healthy Bodies" program is an eight-week course that meets twice a week. Children learn proper ways to exercise and how to incorporate physical activity into their lives. Exercise is made fun and enjoyable and the children take field trips to places such as parks or skating rinks where they can be physically active. Making healthy food choices is encouraged by discussing alternative choices to high fat snacks, learning to read labels, and making field trips to grocery stores. Children keep a food diary of everything they eat, and discuss their choices. The program does not focus on weight, rather on how to be healthier by

making lifetime changes. Children are encouraged to sign up for programs at the YMCA after the course is over to maintain their activity level.

ECONOMIC IMPACT OF OVERWEIGHT AND OBESITY IN SOUTH CAROLINA

The total cost attributable to obesity amounted to $99.2 billion in the U.S. in 1995. The direct medical costs were approximately $51.64 billion or 5.7% of our National Health Expenditure (89). Approximately 63% of the direct medical costs associated with obesity were for Type 2 diabetes, 14% for coronary heart disease, 8% for osteoarthritis, 6% for high blood pressure, 5% for gallbladder disease, and 4% for all cancers (89). These estimates are conservative for at least two reasons: 1) obesity was defined as BMI of 29 or greater whereas increased risk has been established at a BMI of 25 or greater for most conditions, and 2) diseases also known to be associated with obesity were not included in the cost estimates (chronic obstructive pulmonary disease, low-back pain, other circulatory disorders including stroke, congestive heart failure, arteriosclerosis).

The excess burden of obesity also was estimated using data from the National Health Interview Survey (NHIS) inflated to 1995 dollars. Using data from the 1994 NHIS, the cost of lost productivity attributed to obesity (BMI$\geq$30) was $3.9 billion or 3.9 million days of lost work. From the 1988 to the 1994 NHIS, the number of restricted activity days increased 36%, bed-days increased 28%, and work-lost days increased 50%; most notably, the number of physician visits attributed to obesity increased 88% over the 6 years (89).

Quesenberry et al. (90) utilized patient data from a large health maintenance organization survey (number of patients=17,118) conducted in 1993. They estimated that excess direct outlays attributable to obesity were $220 million or approximately 6% of the total cost of health care for the 2.4 million members. There was an association between BMI and annual rates of

inpatient days, number and cost of outpatient visits, cost of outpatient pharmacy and laboratory services, and total costs. Relative to normal weight patients, costs were 25% greater among those with BMI of 30 to 34.9 kg/m^2 and 44% greater among those with BMI of 35 kg/m^2 or greater. The association between BMI and coronary heart disease, high blood pressure, and diabetes largely explained these elevated costs (90).

Among private sector firms in the U.S., the total cost of obesity to business was estimated to be $12.7 billion in 1994 (91). These costs were derived from employees aged 25 to 64 years. Of this cost, $2.6 billion was attributed to BMIs characteristic of overweight (25-28.9 kg/m^2) and $10.1 billion was attributed to BMIs characteristic of obesity ($\geq$ 29 kg/m^2). Health insurance expended $7.7 billion (43% of all spending by U.S. business) on coronary heart disease, high blood pressure, Type 2 diabetes, unfavorable blood lipid levels, stroke, gallbladder disease, osteoarthritis of the knee, and endometrial cancer. Overall, obesity accounted for about 5% of total medical costs in this private sector (91).

Overweight and obesity are associated with the most common, costly, and preventable chronic diseases in our state and country. Chronic diseases now account for over 60% of the nations' total medical care costs (92). In South Carolina, six of the ten leading causes of death in 1997 were chronic conditions, which can be attributed at least partly to lifestyle factors. Diseases of the heart is the leading cause of death, followed by cancer (2^{nd}), cerebrovascular disease (3^{rd}), chronic obstructive pulmonary disease (5^{th}), and diabetes (6^{th}). Table 4 presents a few examples of the high costs associated with the treatment of chronic diseases related to obesity in South Carolina.

Table 4. Average Inpatient Hospital Charges for Common Obesity-Related Conditions and Surgical Procedures, South Carolina, 1997.

Conditions or Procedures	Average hospital charge, 1997*
Acute Myocardial Infarction	$ 9,019
Angina Pectoris	$ 4,083
Asthma	$ 4,440
Back Pain	$ 4,358
Cardiac Catheterization	$ 11,086
Cardiac Dysrhythmia	$ 4,859
Congestive Heart Failure	$ 7,242
Coronary Bypass	$ 43,279
Diabetes Mellitus	$ 4,674

*Source: Budget and Control Board, Office of Statistics and Research, Health Statistics (www.orss.state.sc.us)

Based on prior work by Wolf and Colditz (89), an estimate of the costs attributable to obesity in the State can be made. Table 5 includes in-patient and emergency room data for conditions related to obesity. An estimated 'proportion' of the disease attributable to obesity is applied to total medical costs to derive an estimate of the cost of obesity.

Table 5. Estimated cost of obesity in South Carolina, 1997 (includes in-patient and emergency room visits)

Condition	ICD-9 code	1997 Costs *	Proportion of cost attributable to obesity **	Cost attributable to obesity
Diabetes	250	73,546,325	61.0%	44,863,258
Coronary Heart Disease	410-414	507,359,598	17.3%	87,773,210
High blood pressure	401-404	52,587,326	17.0%	8,939,845
Gallbladder	574	61,743,068	30.0%	18,522,920
Osteoarthritis	715	88,439,897	11.8%	10,435,908
Cancer				
Breast	174	14,282,356	11.0%	1,571,059
Endometrial	182	4,541,195	34.0%	1,544,006
Colon	153	33,546,155	11.3%	3,790,716
TOTAL				**$177,440,922**

* 1997 Hospital discharge data and ER data for the conditions above listed as primary diagnosis.
** Wolf & Colditz, 1998 (obesity was defined as $\geq$ 29 kg/m^2)

It should be noted that the direct medical cost estimates fail to account for the increased death rate among obese people. Estimated direct costs would then be about 25% lower, or about $133 million (93).

On the other hand, this estimate does not include indirect costs for obesity. Based on Wolf and Colditz's work (89), indirect costs result from the value of lost output due to reduction or cessation of productivity due to disease or death. Indirect disease costs are wages lost by people who are unable to work, and death costs are the value of future earnings lost by people who die prematurely. Indirect medical costs in South Carolina would be almost $164 million which would give a grand total of over $341 million for both direct and indirect medical costs.

The estimates of the economic impact of obesity are less than precise. The cost of obesity is comparable to that of other chronic diseases, yet it receives disproportionately less attention (94).

Medicaid

In South Carolina in 1997, there were over 430,000 individuals eligible for Medicaid each month (source: South Carolina Department of Social Services). Medicaid expenses impact directly on the State's budget. Table 6 shows obesity-related costs for Medicaid-covered expenses.

Table 6. Medicaid expenses for obesity-related conditions in South Carolina, 1998 (includes in-patient, physician, outpatient surgical, and emergency room visits)

Condition	ICD-9 code	1998 Medicaid Expenses*	Proportion of cost attributable to obesity **	Cost attributable to obesity
Diabetes	250	17,688,520	61.0%	$10,789,997
Coronary Heart Disease	410-414	30,002,834	17.3%	$5,190,490
High blood pressure	401-404	8,821,402	17.0%	$1,499,638
Gallbladder	574	9,218,694	30.0%	$2,765,608
Osteoarthritis	715	4,743,180	11.8%	$559,695
Cancer				
Breast	174	2,214,323	11.0%	$243,576
Endometrial	182	360,480	34.0%	$122,563
Colon	153	2,357,939	11.3%	$266,447
TOTAL				**$21,438,014*** **

*Source: Budget and Control Board, Office of Statistics and Research
** Wolf & Colditz, 1998 (obesity was defined as $\geq$ 29 kg/m^2)
*** Includes Federal and State Medicaid costs. State costs in 1998 were 30.08% of this total.

Indirect Medicaid costs for South Carolina would be $19.8 million giving an annual grand total of $41.2 million in direct and indirect Medicaid costs to the State.

CURRENT RESEARCH STATUS OF OVERWEIGHT AND OBESITY IN SOUTH CAROLINA

New and exciting research in the field of overweight and obesity is emerging daily. In preparing this report, it was difficult to keep up with the latest findings. Many of the references cited were published in 1999. The entire October 27th, 1999, issue of JAMA was devoted to obesity. Just one year ago, the National Heart, Lung and Blood Institute published its report entitled *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report* (3), and the USDA held its symposium on *Childhood Obesity: Causes and Prevention* (68). This section provides a review of the research being conducted in South Carolina to date.

There are several research programs related to the prevention or treatment of obesity at the University of South Carolina and at the Medical University of South Carolina. These programs are funded by the National Institutes of Health, the Centers for Disease Control and Prevention, and other agencies.

University of South Carolina (USC)

In December 1998, the USC School of Public Health identified obesity as one of three areas in which the School might benefit from a concentrated, interdisciplinary effort toward a program of research excellence. Consequently, the Obesity Research Working Group was formed. The group proposes a Center on Obesity and Nutrition Research with a mission of studying the distribution, the behavioral, metabolic, and health implications of obesity across the

lifespan in diverse communities, and developing recommendations for public health practice and policy.

Strategies for Effective Weight Management in Type 2 Diabetes

POWER (Pounds Off With Empowerment) is a Centers for Disease Control (CDC)-funded project which evaluated the effectiveness of a weight management program for persons with diabetes conducted within a primary care practice located in a medically under-served community. This program emphasized frequent contact between participants and a registered dietitian to include group and individual sessions, low-calorie/low-fat diet, increased physical activity and self-monitoring tools for diet and physical activity. Enhancements were added to the materials which include: 1) inclusion of diabetes-specific information (e.g. timing of meals, encouraging home blood glucose monitoring), 2) revisions so that the materials were regionally and culturally appropriate for individuals with low income and less than a high school education, and 3) inclusion of empowerment evaluation, designed to allow for continuous quality improvements in the delivery of the intervention. Empowerment evaluation also involved a high level of interaction with the participants' health care team including sharing of clinical information and proactive coordination with other health education efforts, particularly related to diabetes care.

An eight-week pilot study was conducted in a federally funded primary care clinic in Orangeburg, South Carolina. All participants were minorities and 78% lost weight. The average blood sugar of the participants decreased by 24 mg/dl over the eight-week period. Experiences from the pilot study are currently being used to guide preparations for a 12-month trial set to begin in January 2000.

Motivational Strategies to Enhance Weight Loss and Weight Loss Maintenance

Palmetto Richland Memorial Hospital is the site for this CDC-funded study being conducted to evaluate motivational strategies to enhance weight loss in learning disabled groups and in the normal population. The core components include instruction in diet, physical activity and behavior change strategy. The components still being tested for effectiveness are: 1) classes on motivational issues related to stages of change and 2) home visits. Recruited primarily from the Family Practice Clinic at the hospital, participants will include 125 adults who are learning disabled and 125 who are not. Preliminary results from 101 participants who have completed the program show greater success in weight loss for individuals who receive the stages-of-change based motivational sessions. Thus far, individuals who receive home visits have not shown greater success in weight loss compared to those not receiving home visits. A follow-up study is being designed to more fully determine which aspects of the motivational sessions increase likelihood of success in weight loss.

Medical University of South Carolina (MUSC)

Clinical research

The MUSC Weight Management Center conducts clinically oriented research in two main areas: clinical trials of treatment methods, and studies of psychological and behavioral correlates of obesity and weight loss. In the last five years, the Weight Management Center has participated in nine funded trials of experimental weight loss medications, with combined budgets in excess of $1.5 million. These studies included trials important in the approval of the two most recent weight loss medications as well as other medications not yet approved. Recent psychological/ behavioral research has focused on such topics as: 1) factors influencing

individuals' weight goals, 2) how patients' weight-related thought patterns influence their success at weight loss, 3) the prevalence of binge eating disorder among treatment-seeking patients, and 4) relations of intake of certain nutrients on mood.

Basic Science

Leptin

Studies are currently being conducted on the hormone leptin. This hormone is produced by the fat cells and appears to inform the brain about the body's fat stores so that energy intake and output can be regulated. The ways that leptin contributes to this process are the subject of the MUSC research being funded by the National Institutes of Health, the United States Department of Agriculture, and the American Diabetes Association.

Genetic markers for obesity and diabetes

The Sea Islands Families Project/ Project Sugar is a community-based research project to identify genes that contribute to obesity and Type 2 diabetes in African Americans. Persons with obesity and diabetes are recruited from families living on barrier islands along the South Carolina Coast ("Sea Islands") and adjacent coastal communities. Project Sugar assesses medical, anthropometric, and metabolic (laboratory) information on affected and non-affected family members, and establishes a computer database and DNA bank. To date, 407 families have been enrolled, and over 1,000 family members have been tested for specific genes including more than 800 with obesity. Participants have an average age of 55 years and average BMI of 33.

Data has indicated that these Gullah sea islanders are the most homogeneous population of African descent in the United States and are closely related to West African tribes living in Sierra Leone. Researchers have established a good working relationship with the community they are studying through hiring community members to conduct the studies, providing benefits to the community in tangible and immediate ways, and by collaborating with community institutions. The Project receives oversight and guidance from a Citizens Advisory Board so that the study is conducted in a culturally sensitive manner and serves as a forum for communication and interaction with the community. These measures have enabled successful interchange and intervention to take place with a population that might otherwise have been distrustful of biomedical research.

Project Sugar has identified several potential obesity- susceptibility genes in African Americans. One gene difference results in a tendency to use carbohydrate as fuel and to store fat. This adaptation is useful when there is not a constant food supply, but would lead to obesity with continual access to high fat foods. The frequency of this gene difference was found to be twice as high in severely obese individuals as compared to those who were lean. Thus, this genetic variation was associated with severe obesity. MUSC researchers hypothesize that this variation results in the body's preferential use of carbohydrate over fat for fuel and the favoring of fat storage, but that excess fat storage will not occur unless these individuals are exposed to a high fat diet.

Cardiovascular risk factors in obesity

Other research at MUSC focuses on obesity and the clustering of cardiovascular risk factors related to insulin resistance. These studies indicate that obese subjects with the risk

factor cluster have elevated plasma of non-esterified fatty acids that are highly resistant to suppression by insulin. This finding is important because the studies have also shown that certain fatty acids may contribute to blood vessel damage and high blood pressure.

Epidemiological studies

The MUSC Department of Biometry and Epidemiology has several ongoing studies of particular relevance to obesity, including examinations concerning: 1) the association of body mass and high blood pressure and high blood pressure-related outcomes in different racial groups; 2) obesity as a major indicator for epidemiologic study and surveillance by the Surveillance Council of the Diabetes Initiative of South Carolina; 3) relation of fetal early life events to childhood and adult obesity; 4) effects of obesity and the progression of diabetes and high blood pressure on end-stage renal disease in South Carolina and the Southeast.

MUSC/ HBCU Partners in Wellness

This is a collaborative program of South Carolina's Historically Black Colleges and Universities (HBCU), South Carolina Area Health Education Consortium (AHEC), and the Medical University of South Carolina (MUSC) to document and reduce risks for obesity, high blood pressure, and diabetes through student research, teaching, and service to communities.

Obesity, diabetes, and high blood pressure exact a tremendous burden on the health of South Carolinians, and disproportionately affect African Americans. Early prevention and interventions reduce disease and death. However, African Americans are under-represented in the health professions and few community programs have documented effectiveness in reducing risks in African American communities. This project includes a plan to reduce risks and recruit African Americans into careers in the health professions by engaging undergraduate students in a

course of study that involves research, teaching, and service related to community-based health interventions. It seeks to actively involve HBCU students in learning about the roles of health professionals and in providing service to communities. The project's four specific aims are: 1) to provide a course in community health that will increase awareness among students regarding obesity, diabetes, and high blood pressure, raise interest in health care professions, and increase the number of applications to MUSC training programs by qualified minority candidates; 2) to screen up to 8,000 HBCU students for risk factors for obesity, diabetes, high blood pressure, and cardiovascular disease; 3) to study the epidemiology of obesity, diabetes, and high blood pressure in African Americans, specifically prevalence, and low birth weight as a predictor of the occurrence of cardiovascular disease risk factors later in life; and 4) to establish a model wellness support center at South Carolina State University (SCSU) that could focus on improving the health of African Americans through service, research, and teaching, and could be exported to other HBCUs.

Winthrop University

Numerous studies at Winthrop have collected data on obese or overweight women in South Carolina. The studies have looked at the associations between body weight and food intake frequency, physical fitness, blood lipid levels, depression, self-esteem, and other eating behaviors and lifestyle patterns. Data was collected from Caucasian and African American women, food stamp recipients, pre- and post-menopausal women, and residents of rural areas.

Successful weight maintenance in normal weight women was found to be related to regular exercise, evenly distributed food intakes, and having a sense of control over their own

health. Other studies on food intake frequency suggest that women may be able to increase their food consumption without gaining weight if they eat more frequently throughout the day.

Obese women were shown to have lower fitness levels and less desirable blood lipid levels than normal weight subjects. Depression was not shown to be a major problem in either obese or normal weight subjects, but at higher levels of depression, BMIs, disinhibition, and perceived hunger scores increased. Disinhibition is a lack of restraint that results in eating large amounts of food. The opposite behavior is cognitive restraint where individuals eat less because their brains are telling them not to eat specific foods or amounts. Cognitive restraint scores were significantly higher in normal weight subjects. Another study showed disinhibition to be a high predictor of BMI in obese, middle-aged women. Measures of self-esteem in rural, middle income men and women in South Carolina revealed that self-esteem may not be related to increased body weight as it is in urban, middle to upper income groups.

Childhood Obesity

Developing standards for assessment of obesity in children is important for conducting research. Until recently, there was no internationally accepted index to assess childhood obesity nor was there an established cut-off point to define overweight in children. The 85^{th} and 95^{th} percentiles of BMI for age and sex are often used as cut-off points for overweight and obesity in children, respectively. However, a group of experts in the field suggested using the same cut-off points for adult morbidity, BMI greater than or equal to 25 and 30 kg/m^2 (67).

The 1999 YRBS survey of high school students used the 85^{th} and 95^{th} percentiles as cutoffs. These are the first data that can be used to characterize the overweight and obese status of the high school student population in South Carolina, yet they rely solely on self-report.

Data on younger children are even more limited. Additional data collection will be required to accurately characterize the childhood obesity in the State.

More extensive research is desperately needed in the area of childhood obesity in South Carolina. Some studies are being conducted at MUSC.

The MUSC Pediatric Endocrinology section has been conducting research on the nature and treatment of Type 2 diabetes among children, about 80-90% of whom are obese. They have identified an atypical form of diabetes that occurs predominantly among obese African American children and have a grant application pending to explore some of the genetic underpinnings of this condition. They have also studied the effects of a very-low-calorie diet for weight loss and control of the condition.

The MUSC Institute of Psychiatry Eating Disorders Program has examined the prevalence of weight control behaviors and associated feelings, and eating disorder symptoms among middle school students. Using a newly developed self-report instrument, the Kids' Eating Disorders Survey (KEDS), 3,175 students enrolled in grades five to eight were surveyed. More than 40% of respondents reported feeling fat and/or the wish to lose weight. The frequencies of selected weight control behaviors were: dieting (31.4%), fasting (8.7%), diet pill use (2.4%), vomiting (4.8%), and diuretic use (1.5%). These results suggest the importance of monitoring the appropriateness of weight control behaviors by children as early as middle school years.

NOTED STATE RESOURCES

THE DIABETES INITIATIVE OF SOUTH CAROLINA (DSC)

The Diabetes Initiative of South Carolina (DSC) was established by legislative action in July 1994. The purpose of the Diabetes Initiative is to develop and implement a comprehensive

statewide plan of community outreach programs, health professional education, and diabetes surveillance. The goal is to provide the tools for management of the disease to reduce severe complications and cost burdens for South Carolinians suffering from diabetes mellitus. The Initiative represents a unique melding of private, state, and federal resources toward this common goal. South Carolina's coordination of public efforts to identify and manage this incurable chronic disease established the state as a leader in the nation.

Obesity and diabetes are strongly related. Collaboration with Diabetes Initiative programs would naturally follow when designing strategies to address obesity. DSC also can be used as a successful model of how to move from initial legislation to concerted action on community, professional and academic levels.

PHYSICAL ACTIVITY IN SOUTH CAROLINA

"Good Health: It's Your Move - a Report on Physical Activity in South Carolina" was prepared for the South Carolina Department of Health and Environmental Control by the Prevention Research Center at the University of South Carolina School of Public Health, in May 1999. The report was prepared to assist professionals and community leaders in their efforts to promote physical activity in the State.

Increasing physical activity is a key component of obesity management, particularly in the maintenance of weight loss. The programs and resources listed in this report can be important assets when planning treatments and strategies for the management of obesity.

CONCLUSIONS OF THE ADVISORY COMMITTEE

- Overweight and obesity are of epidemic proportions in the State of South Carolina occurring in 53% of the adult population and 65% of the African American population. South Carolina's overweight and obesity rates for children have not yet been adequately determined due to lack of data. However, national rates indicate that one in five children in the U.S are overweight or obese.

- Overweight and obesity are strongly related to the high rates of diabetes, coronary heart disease and stroke that afflict our State.

- Obesity-related conditions cost South Carolina an estimated $177 million in 1997.

- An estimated $21 million Medicaid dollars were attributed to obesity related conditions 1998.

- Obesity in childhood is a predictor of adult obesity. However, the prevention and management of childhood obesity must be addressed differently than obesity in adults.

- South Carolina lacks sufficient data to characterize the problem of obesity, particularly in children.

- Future research is needed on interventions that are effective for South Carolina's populations.

- There is a lack of coordination and infrastructure in the State to adequately address the complex problem of obesity.

- There is a lack of resources available to at-risk populations in the State who wish to lose weight to improve their health.

- There is a need for implementation of statewide obesity prevention interventions targeting children.

- There is a need for implementation of statewide obesity prevention interventions in adults which include a focus on:
    - Dietary habits
    - Physical activity
    - Behavior modification
    - Access to resources

- There is a lack of funding to implement any efforts to stem the tide of the rising rates of obesity in South Carolina.

APPENDIX A

CONCURRENT RESOLUTION

COMMITTEE REPORT
April 21, 1999
S. 252

Introduced by Senator Giese

S. Printed 4/21/99--H.
Read the first time February 17, 1999.

**THE COMMITTEE ON MEDICAL,
MILITARY, PUBLIC AND MUNICIPAL AFFAIRS**

To whom was referred a Concurrent Resolution (S. 252), to request the Commissioner of the Department of Health and Environmental Control to study the effect of obesity, etc., respectfully

REPORT:

That they have duly and carefully considered the same, and recommend that the same do pass:
JOE E. BROWN, for Committee.

STATEMENT OF ESTIMATED FISCAL IMPACT

ESTIMATED FISCAL IMPACT ON GENERAL FUND EXPENDITURES IS:
Minimal (Some additional costs expected but can be absorbed)
ESTIMATED FISCAL IMPACT ON FEDERAL & OTHER FUND EXPENDITURES IS:
$0 (No additional expenditures or savings are expected)

EXPLANATION OF IMPACT:
The Department of Health & Environmental Control (DHEC) reports that such a study would require a nutritionist, to serve as the Study Coordinator, a researcher and an administrative assistant hired on a consulting basis, and would take approximately 10 months to complete. The work plan would include a literature search of previous studies on obesity and its relationship to diabetes, heart disease, stroke and other costly health complications; convening a panel of experts in obesity complications to develop a comprehensive study plan; evaluation of the study; development of the report to the General Assembly, and coordination of all activities.
The costs associated with this study would be minimal and could be absorbed by the agency.
Approved By:
Don Addy
Office of State Budget

A CONCURRENT RESOLUTION

TO REQUEST THE COMMISSIONER OF THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL TO STUDY THE EFFECT OF OBESITY IN BOTH ADULTS AND CHILDREN ON COSTLY HEALTH COMPLICATIONS SUCH AS DIABETES, HYPERTENSION, HEART DISEASE, AND STROKES AND OTHER HEALTH COMPLICATIONS IN CHILDREN, TO MAKE RECOMMENDATIONS FOR IMPROVEMENT IN AWARENESS OF THE PROBLEM OF OBESITY AND SUGGESTED TREATMENT MODALITIES, AND TO REPORT THE FINDINGS OF THIS STUDY AND RECOMMENDATIONS TO THE GENERAL ASSEMBLY BEFORE THE CONVENING OF THE 2000 REGULAR SESSION.

Whereas, a causal relationship exists between obesity and a number of serious disorders, including hypertension, dyslipidemia, cardiovascular disease, diabetes (type two), gallbladder disease, respiratory dysfunction, gout, and osteoarthritis; and

Whereas, the National Institute of Diabetes and Digestive and Kidney Diseases indicates that nearly eighty percent of patients with diabetes mellitus are obese and the incidence of symptomatic gallstones soars as a person’s body mass index increases beyond a certain level; and

Whereas, nearly seventy percent of diagnosed cases of cardiovascular disease are related to obesity, and obesity more than doubles a person's chances of developing high blood pressure, and almost half of breast cancer cases are diagnosed among obese women, and forty-two percent of colon cancer cases are among obese individuals; and

Whereas, obesity ranks second only to smoking as a preventable cause of death and results in some three hundred thousand deaths annually; and

Whereas, it is estimated that thirty-five percent of the adult population is obese and the prevalence of obesity grew a shocking thirty-four percent during the past ten years; and

Whereas, a 1997 study by Kaiser Permanente indicated that the total direct costs of obesity-related diseases in the United States in 1990 was $45.8 billion; and

Whereas, the Kaiser study concluded that there is a significant potential for a reduction in health care expenditures through obesity prevention efforts; and

Whereas, there is an urgent need for state health care groups and medical societies to place obesity at the top of their health care agendas; and

Whereas, many physicians do not treat obesity because they mistakenly believe there is no treatment for it; and

Whereas, the National Institute of Health, the American Society for Bariatric Surgery, and the American Obesity Association recommend that patients who are morbidly obese receive responsible, affordable medical treatment for their obesity; and

Whereas, the diagnosis of morbid obesity should be a clinical decision made by a physician based on proper medical protocols; and

Whereas, the recent breakthroughs in drug therapy can treat obesity successfully and the New England Journal of Medicine recently emphasized the legitimate use of pharmacotherapy as a component of treatment of medically significant obesity; and

Whereas, the new breakthroughs in obesity treatment are not widely known and efforts must be made to inform the general public and health care professionals that pharmacotherapy can be used as an effective and cost-effective treatment for obesity; and

Whereas, there is also great concern regarding what effect obesity in children may have on overall health in children, health care costs for children, and treatment modalities to address the problem of obesity in children; and

Whereas, a study conducted by the Department of Health and Environmental Control is critical to raise the awareness of the public and private sectors that obesity is a disease of epidemic proportions that is treatable and that proper treatment will reduce health care costs and improve the quality of life for a large number of our citizens. Now, therefore,

Be it resolved by the Senate, the House of Representatives concurring:

That the South Carolina General Assembly, by this resolution, requests the Commissioner of the Department of Health and Environmental Control to study the effect of obesity in both adults and children on costly health complications such as diabetes, hypertension, heart disease, and stroke and other health complications in children, to make recommendations for improvement in awareness of the problem of obesity and suggested treatment modalities, and to report the findings of the study and recommendations to the General Assembly before the convening of the 2000 regular session.

Be it further resolved that a copy of this resolution be forwarded to the Commissioner of the Department of Health and Environmental Control.

APPENDIX B

List of South Carolina Counties by Region

Piedmont

- Abbeville
- Anderson
- Cherokee
- Edgefield
- Greenville
- Greenwood
- Laurens
- McCormick
- Oconee
- Pickens
- Saluda
- Spartanburg
- Union

Midlands

- Aiken
- Allendale
- Bamberg
- Barnwell
- Calhoun
- Chester
- Fairfield
- Lancaster
- Lexington
- Newberry
- Orangeburg
- Richland
- York

Pee Dee

- Chesterfield
- Clarendon
- Darlington
- Dillon
- Florence
- Kershaw
- Lee
- Marion
- Marlboro
- Sumter

Low Country

- Beaufort
- Berkeley
- Charleston
- Colleton
- Dorchester
- Georgetown
- Hampton
- Horry
- Jasper
- Williamsburg

APPENDIX C

Recommendations for Action

The actions listed below are a summary of the recommendations formulated by the members of the Obesity Study Advisory Committee. This list represents a wide range of activities that could be considered, but additional work is needed to identify those actions which would be most cost effective in reducing the problem of obesity.

Administer and coordinate obesity intervention in the State through the Obesity Council. Model the Council after the Diabetes Initiative organization. (See chart to follow this list.)

Collaborate with statewide public, private, and government organizations working on obesity-related issues such as health care professional associations, related disease councils or initiatives, entities supporting physical activity, and community-based groups promoting healthy lifestyles such as churches and fraternities or sororities.

Establish surveillance systems to better monitor obesity in children, adolescents, and adults in South Carolina.

Advocate for public policies to ensure physical activity and fitness for school-aged children by:
- including health and physical education in the Education Accountability Act School Report Card;
- assessing health and physical education program requirements in curricula at the school district level;
- setting standards for fitness and providing aerobic fitness physical education to all school children grades 1–12;
- connecting school and community efforts to support physically active lifestyles.

Support the enforcement of current law related to the 1998 Comprehensive Health Education (CHE) in schools.

Strengthen school food service efforts to implement the Healthy School Meals Initiative.

Reduce availability of competitive foods in schools during meal times.

Institute nutrition education at early ages in school curriculum. Ensure the availability of resources to schools for trained professionals to assist in the delivery of nutrition education.

Ensure a family systems approach to childhood obesity when integrating school and community resources.

Disseminate weight management guidelines for health care providers.

Provide a comprehensive educational program targeting health care providers.

Educate health care providers about the need for effective and aggressive weight management for overweight people with high blood pressure, Type 2 diabetes, and/ or unfavorable blood lipid levels.

Develop social marketing strategies specific to different population segments.

Develop and disseminate public service announcements with consistent message by way of billboards, food store literature, television advertisements, or human interest stories featuring successful weight management.

Provide nutrition education to the general public targeting problem areas of snacking, fast foods, and soft drink consumption as well as promoting healthy eating behaviors.

Support community infrastructure for physically active life styles including the promotion of community designs that include sidewalks, bike routes, and walking trails.

Ensure that obesity reduction/ prevention efforts coincide with the Healthy Communities efforts to support necessary policy and environmental changes.

Incorporate Healthy People 2010 objectives.

Incorporate effective weight management strategies into existing food assistance programs that already target high-risk groups.

Develop incentives for private industry, such as retail businesses and restaurants, to promote healthy lifestyles.

Provide incentives for businesses with worksite wellness programs to promote weight loss.

Document cost savings for treatment of obesity to support reimbursement by health insurance providers.

Partner with existing health insurance companies to study and educate their members on obesity.

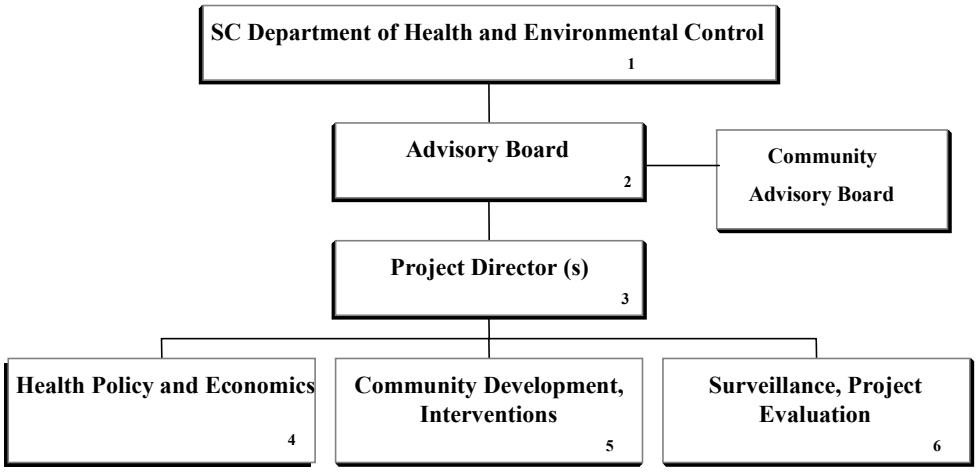
Offer incentives for State employees to participate in effective weight management programs.

Provide technical assistance and consultation to local communities to encourage tailoring interventions to meet specific needs at the local level.

Identify effective weight management techniques for specific high-risk groups by conducting research interventions.

Implement effective weight management techniques by identifying and promoting culturally- and age-appropriate intervention programs.

South Carolina Council on Obesity



APPENDIX D

Fact Sheets on Obesity

Fact Sheet

Adult Obesity

Prevalence of Adult Obesity

- Currently 55% of adults in the United States meet the National Institutes of Health classification of overweight or obesity.*
- South Carolina's rates of overweight and obesity are among the highest in the United States.
- Obesity rates have risen rapidly in the past five years and nearly one in five adults in South Carolina are obese (over half are overweight and obese combined).
- Approximately 65% of the adult African American population in South Carolina is overweight or obese.

Health Complications Associated with Obesity

- Obesity increases the risk for heart disease, diabetes, stroke, high blood pressure, gall bladder problems, osteoarthritis, unfavorable blood lipid levels, as well as breast and colon cancer.
- 300,000 deaths each year may be attributed to lifestyle factors of improper diet and inadequate exercise.
- Obesity costs the U.S. health care system $51.6 billion per year in direct medical expenses, and the indirect costs (e.g. lost wages and productivity) raise the figure to $99.2 billion.
- Obesity costs South Carolina $177.4 million in hospital costs in 1997 and $21.4 million of Medicaid expenses in the State could be attributed to obesity in 1998.

* Classification of obesity is commonly based on Body Mass Index (BMI) which adjusts body weight for height. A BMI of 25-29.9 is classified as overweight while a BMI of 30 or greater is considered obese.

Adapted with permission from the Louisiana Department of Health and Hospitals Ad Hoc Committee on Obesity.

Prevention and Management of Obesity

- Even modest weight loss (5-10% of body weight) is associated with health benefits, including improvement in blood pressure, good cholesterol (HDL), blood sugar and the need for medication.

- Nutrition: The goal of nutrition programs is to decrease calories and fat using culturally appropriate materials focused on increased awareness of fat and calorie content of food, appropriate food choices, food preparation, decreased serving sizes, and strategies for relapse prevention.

- Physical Activity: The goal of physical activity programs is to increase activity levels using lifestyle modification as well as formal exercise programs.

- Behavior Modification: The goal of behavior modification programs is to alter eating and activity patterns by changing people's attitudes, beliefs and motivation in regard to eating and physical activity.

Prevention and Management of Obesity Summary

- Achieving and maintaining appropriate weight requires good dietary patterns and adequate physical activity. Combined treatment approaches (diet, exercise, and behavior modification) are likely to produce better results than any single treatment.

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Fact Sheet

Childhood Obesity

Prevalence of Childhood Obesity

- One in five U.S. children is overweight or obese.*
- Obesity is a chronic disease and is the most prevalent nutritional disease of children and adolescents.
- Childhood obesity has doubled in the past 20 years and currently affects 10 million children.
- *Rates of obesity among children in South Carolina have not been determined yet due to lack of data.*

Role of Childhood Obesity in Adult Obesity

- Targeting obesity in childhood can impact and prevent adult obesity.
- 80% of obese children become obese adults. The risk for adult obesity increases with level of childhood obesity.
- Weight loss during childhood can be maintained into adulthood.

Link of Obesity to Environmental Factors

- The more than 200% increase in obesity in the past 15 years clearly reflects environmental rather than genetic factors.
- Behavioral factors (physical activity and diet) are modifiable and logical targets for intervention.

* Classification of obesity is commonly based on Body Mass Index (BMI) which adjusts body weight for height. A BMI greater than the 85th percentile is classified as overweight while a BMI greater than the 95th percentile is considered obese for children of the same age and gender.

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Consequences of Childhood Obesity

- The following medical factors are associated with obesity: unfavorable blood lipid levels, high blood pressure, diabetes, asthma, and early maturation.

- The major sources of health complications in obese children include sleep apnea, Type 2 diabetes and orthopedic complications.

- The most serious and prevalent long-term consequences include mental health problems such as depression, lower self-esteem, and discrimination by peers, family, and teachers.

Prevention and Management of Childhood Obesity

- Parental obesity is the single most important predictor of childhood obesity; therefore, family based therapy is recommended. Usual treatment recommendations include promotion of healthy eating patterns and reducing inactivity.

- Obesity and overweight are easier and less costly to prevent than to treat. Adopting healthy dietary and physical activity habits early in life is most effective.

Adapted with permission from the Louisiana Department of Health and Hospitals Ad Hoc Committee on Obesity.

Appendix E

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